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STATE OF ALASKA  
 Walter J. Hickel, Governor

ANNUAL REPORT OF PROGRESS, 1967 - 1968

FEDERAL AID IN FISH RESTORATION PROJECT F-5-R-9

SPORT FISH INVESTIGATIONS OF ALASKA

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## INTRODUCTION

This report of progress consists of findings and work accomplished under the State of Alaska Federal Aid in Fish Restoration Project F-5-R-9, "Sport Fish Investigations of Alaska."

The project during this reporting period was composed of 21 separate studies. Of these, seven jobs continued the inventorying and cataloging of the numerous waters, providing a comprehensive index of the State's recreational waters. Nine jobs accomplished special studies involving Dolly Varden, grayling, silver salmon, king salmon and sheefish, among others. The remaining five jobs are designed to accomplish creel census, migration, access and silver salmon egg-take studies. The egg-take study, Job 7-F, was inactive because egg-takes were accomplished under other projects.

Special reports on specific phases of the Dolly Varden Life History Study have been published in the Department's Research Report series.

The information gathered from all of these studies provides the background necessary for better management and assists in development of future investigational studies.

The subject matter contained within these reports is often fragmentary in nature. The findings may not be conclusive and the interpretations contained therein are subject to re-evaluation as the work progresses.

## RESEARCH PROJECT SEGMENT

STATE: ALASKA Name: Sport Fish Investigations of Alaska.  
Project No.: F-5-R-9 Title: Inventory and Cataloging of the Sport Fish and Sport Fish Waters in Southeast Alaska.  
Job No.: 1-A

Period Covered: July 1, 1967 to June 30, 1968.

## ABSTRACT

Inventory and cataloging of Southeast Alaska sport fish resources continued during the 1967-68 fiscal year as a continuation of previous studies.

New waters were investigated for evaluations of existing sport fish stocks, and to determine which stocks possess the greatest potential for enhancement through the application of fishery management practices.

Waters that are presently included in the overall management program were re-studied to determine the success of prior fish stockings, rehabilitative measures, and related management procedures.

During the study period, fifty-two lakes were investigated in Southeast Alaska. Twenty-four lakes were stocked with either Arctic grayling or rainbow trout. Fish were introduced into twelve barren lakes and the remaining lakes were re-stocked as a continuation of existing fish stocking programs.

A transplant of adult kokanee from Distin to Thayer Lake was accomplished for the third consecutive year. A total of 3,632 spawning kokanee has been successfully introduced into Thayer Lake, constituting one complete three-year cycle.

A steelhead egg take was conducted on Kah Sheets Bay Creek, located near Petersburg, and a total of 67,235 eggs was artificially spawned for hatching, rearing, and ultimate stocking in Southeast Alaska.

Creel census was conducted on salmon and trout fishermen in the Petersburg area for estimations of total angler effort and catch. A random creel census of freshwater anglers in the Ketchikan area was also conducted on a number of streams.

## RECOMMENDATIONS

1. The program of investigational study be continued both on new unsurveyed waters and those presently included in the management program.
2. Primary work emphasis be placed on those waters in closest proximity to the population centers, and on those with access being improve through completion of expanding road and trail systems.
3. Efforts be made to assess the success of the three-year kokanee transplant program.

4. Evaluations of the stocked waters be continued to evaluate current stocking policies.
5. No change be made in the general Southeast Alaska regulations at this time.

#### OBJECTIVES

1. To assess the environmental characteristics of the existing and potential recreational fishery waters within the job area.
2. To evaluate the degree of success obtained from past fishery restoration measures and determine and implement needed population manipulation measures.
3. To evaluate multiple water use development projects (public and private) and their effects on the area's streams and lakes for the proper protection of the sport fish resources.
4. To assist, as required, in the investigation of public access status to the area's fishing waters.

#### TECHNIQUES USED

Results and information from prior studies were used to direct some phases of the investigational work.

Fish population sampling, determinations of water chemistry, and accumulation of biological and physical survey data were accomplished using standard biological techniques, and as discussed in prior reports (Heckart, 1967).

Watershed uses and developments affecting the sport fish resource and its environment were monitored and recommendations made.

Complete files of investigational results were maintained in the respective field offices for reference and to aid in the direction of future fisheries management.

#### FINDINGS

##### Upper Southeast Alaska

The upper southeast area includes an approximate 30,000 square mile area which encompasses the major communities of Juneau, Sitka, Petersburg, Wrangell, Haines, Skagway, and Yakutat.

Major investigational and management emphasis was in the area of the larger population centers - Juneau, Sitka, and Petersburg. The degree of survey and investigational work conducted on any lake or stream was governed by current management needs, with cognizance of potential demands through road and trail extensions, or angler requests.

Increased study was placed on waters currently included in the management program to determine stocking successes, angler usage, catch information.

Particular attention was given to the freshwater salmon fishery on three Petersburg area streams. A significant portion of the sport fishing in Petersburg is conducted for coho, Oncorhynchus kisutch (Walbaum); chum, O. keta (Walbaum); and pink salmon, O. gorbuscha (Walbaum). Determination of angler catch and effort was recorded through a creel census program.

Waters more than fifty miles from the population centers were generally given lower priority for survey work, as these lakes and streams habitually support less angling pressure due to the cost of transportation.

Kokanee Transplant:

The third annual transplant of kokanee, O. nerka (Walbaum), from Distin to Thayer Lake was accomplished during the latter part of September 1967. Both lakes are located in the central area of Admiralty Island.

A total of 1,813 adult kokanee was introduced to Thayer Lake. Considering both numbers of fish and fish condition, the 1967 transplant constituted the most successful of the three conducted to date.

With the completion of the 1967 transplant a total of 3,632 spawning, adult kokanee have been introduced to Thayer Lake, representing three consecutive age classes.

Techniques employed were identical to those of the 1965 and 1966 operations. Modified fyke nets were used to capture the fish from the shallow, shoal areas. The captured fish were then held in 4' x 4' live cars until their ultimate aerial trip to Thayer Lake, approximately five minutes distant.

During the flight from Distin to Thayer the fish were held in fifteen-gallon water-filled plastic containers, with an average of three hundred fish per container. No anesthetic or depressant was used, or necessary, as the fish tolerated handling and transportation in exceptionally good fashion. No visible mortality occurred from the aerial transportation phase of the operation.

One of the program objectives, the introduction of a forage species into Thayer Lake which will provide minimum competition for existing cutthroat, Salmo clarki (Richardson) and Dolly Varden, Salvelinus malma (Walbaum), is discussed in the 1966-67, Volume 8, Dingell-Johnson Project Report.

Lake Investigations, Upper Southeast Alaska:

During the 1967 field season, thirty lakes were investigated in upper Southeast Alaska. Twelve were assessed for the first time while the remaining twenty-one were re-studied to determine the success of prior fish stockings and general population dynamics.

The lakes surveyed for the first time are shown in Table 1.

TABLE 1 - Initial Lake Surveys, Upper Southeast Alaska, 1967.

<u>Lake</u>	<u>Location</u>	<u>Latitude</u>	<u>Longitude</u>	<u>Quadrangle</u>
Bohemian	Kupreanof Is.	56 55'00"N	133 28'00"W	Petersburg D-5
Kalinia	Kupreanof Is.	56 43'00"N	133 28'00"W	Petersburg C-5
Kushneaheen	Kupreanof Is.	56 30'00"N	133 31'00"W	Petersburg B-5
Elfendahl	Chichagof Is.	57 50'10"N	136 15'20"W	Sitka D-7
Morris	Chichagof Is.	57 50'00"N	136 15'10"W	Sitka D-7
Unnamed	Chichagof Is.	57 35'10"N	135 50'00"W	Sitka C-6
Rust	Chichagof Is.	57 35'50"N	135 55'40"W	Sitka C-6
Unnamed	Chichagof Is.	57 35'30"N	135 55'00"W	Sitka C-6
Unnamed	Partofshikof Is.	57 15'10"N	135 35'30"W	Sitka B-5
Unnamed	Baranof Is.	56 33'00"N	134 59'00"W	Port Alexander C-3
Unnamed	Baranof Is.	57 19'00"N	135 34'00"W	Sitka B-5
L. Lake Eva	Baranof Is.	57 23'30"N	135 02'00"W	Sitka B-4

Fish stocking recommendations are made for five barren lakes and one rehabilitated lake which were studied in 1967. These lakes, their locations, and recommended fish species are presented in Table 2.

TABLE 2 - Fish Stocking Recommendations, Upper Southeast Alaska, 1967.

<u>Lake</u>	<u>Location</u>	<u>Recommended Species</u>
Deer	Baranof Is.	Rainbow
Pass	Baranof Is.	Rainbow
Rostislaf	Baranof Is.	Rainbow
Unnamed (Sisters)	Chichagof Is.	Rainbow
Unnamed (Partofshikof)	Partofshikof Is.	Grayling
Spurt Point (Rehabilitated)	Thomas Bay-Mainland	Rainbow

### Population Analysis

A summation of all lakes sampled for fish population analysis in upper Southeast Alaska is presented in Table 3.

The lakes depicted were net-sampled with variable mesh monofilament gill nets. The nets were normally fished overnight, but in the case of the more remote lakes, the sample period encompassed several days to insure the catch of an adequate fish sample.

The lakes were investigated both to determine existing fish population condition in new lakes and to assess results of previous fish introductions in those currently under management.

### Fish Stockings

Fifteen lakes were stocked with either Arctic grayling, Thymallus arcticus (Pallas) or rainbow trout - steelhead, Salmo gairdneri (Richardson) in upper Southeast Alaska during 1967. Tyee Lake, Spurt Pt. Lake, Deer Lake, Rostislaf Lake, Pass Lake and Partofshikof Lake were initial plants while the remainder were planted as a continuation of existing stocking programs (Table 4).

TABLE 4 - Lake Stockings, Upper Southeast Alaska, 1967.

<u>Lake</u>	<u>Location</u>	<u>Species</u>	<u>Numbers</u>
Spurt Pt.	Thomas Bay - Mainland	Rainbow	12,200
DeBoer	Thomas Bay - Mainland	Rainbow	1,000
Tyee	Bradfield Canal - Mainland	Grayling	20,000
Glory	Taku Inlet - Mainland	Grayling	30,000
Q T	Mendenhall Valley - Mainland	Rainbow	2,000
Marshall Pond	Mendenhall Valley - Mainland	Rainbow	3,000
Norton Pond	Mendenhall Valley - Mainland	Rainbow	5,000
Louie Pond	Mendenhall Valley - Mainland	Rainbow	5,000
Peterson	Tee Harbor - Mainland	Steelhead	17,000
Lower Dewey	Skagway - Mainland	Rainbow	10,000
Deer	Baranof Island	Rainbow	7,500
Rostislaf	Baranof Island	Rainbow	5,000
Pass	Baranof Island	Rainbow	5,000
Biorka Pond	Biorka Island	Rainbow	2,500
Partofshikof	Partofshikof Island	Grayling	10,000

TABLE 3 - Test Netting Summaries, Upper Southeast Alaska, 1967.

<u>Lake Name</u>	<u>Species</u>	<u>No. of Fish</u>	<u>Length Range Centimeters</u>	<u>Length Mean Centimeters</u>	<u>Frequency*</u>	<u>Percent Comp.</u>
<u>Admiralty Island</u>						
Thayer**	Ct	33	16.7 - 29.2	22.6	1.06	51%
	DV	31	16.2 - 27.6	22.0	1.00	49%
<u>Baranof Island</u>						
(Unnamed) Banks	Ct	13	16.5 - 24.6	19.8	0.38	100%
Beaver**	Gr	50	17.2 - 31.2	22.0	0.36	100%
Blue	Rb	39	16.7 - 41.1	27.6	2.00	100%
Heart	Eb	25	10.1 - 30.4	19.0	0.96	100%
Deer	No Fish Taken					
L. Lake Eva	Ct	53	17.7 - 48.7	22.6	1.66	70%
	DV	16	16.0 - 28.4	20.0	0.50	21%
	Kok	7	17.0 - 20.3	18.5	0.22	9%
Plotnikof	Rb	2	21.3 - 31.2	26.4	0.08	17%
	DV	10	11.9 - 18.7	16.5	0.40	83%
Swan	Ct	7	22.0 - 39.3	28.9	0.58	88%
	DV	1	None	24.1	0.08	12%
(Unnamed) St. Johns	Ct	36	14.7 - 24.1	19.3	0.86	92%
	DV	3	14.7 - 21.5	17.2	0.07	8%
Thimbleberry	Eb	18	11.6 - 21.8	19.3	1.00	100%
<u>Chichagof Island</u>						
Elfendahl	DV	37	12.7 - 34.5	20.3	0.41	100%
Morris	DV	18	12.1 - 14.2	13.2	0.45	100%
Unnamed (Patterson)	DV	36	12.4 - 26.4	19.8	0.76	100%
Rust	No Fish Taken					
Unnamed (Sisters)	No Fish Taken					

TABLE 3 Continued - Test Netting Summaries, Upper Southeast Alaska, 1967.

<u>Lake Name</u>	<u>Species</u>	<u>No. of Fish</u>	<u>Length Range Centimeters</u>	<u>Length Mean Centimeters</u>	<u>Frequency*</u>	<u>Percent Comp.</u>
<u>Kruzof Island</u>						
Suprise**	Gr	40	20.0 - 23.3	22.0	1.67	100%
<u>Kupreanof Island</u>						
Bohemian	Ct	87	10.9 - 24.3	19.8	0.90	59%
	DV	59	16.5 - 24.1	19.3	0.60	41%
Kalinia	Ct	22	18.7 - 28.9	22.3	0.45	59%
	DV	15	15.2 - 25.9	18.0	0.31	41%
Kushneaheen	Ct	11	17.7 - 30.4	24.8	0.22	31%
	CV	9	18.7 - 37.5	23.6	0.18	25%
	RS	16	25.4 - 68.5	63.5	0.30	44%
Towers	Ct	29	17.7 - 36.5	24.1	0.60	99%
	DV	1	None	14.2	0.02	1%
<u>Partofshikof Island</u>						
Unnamed (Partofshikof)		No Fish Taken				
<u>Mainland, Juneau</u>						
Antler**	Gr	17	27.1 - 37.8	31.4	0.35	100%
Morraine**	SS	49	9.3 - 19.8	12.1	1.02	83%
	DV	10	12.7 - 25.1	18.7	0.21	17%
Glacier**	SS	24	9.3 - 20.8	18.7	1.18	92%
	DV	1	----	13.4	--	4%
	Gr	1	----	29.4	--	4%

TABLE 3 Continued - Test Netting Summaries, Upper Southeast Alaska, 1967.

<u>Lake Name</u>	<u>Species</u>	<u>No. of Fish</u>	<u>Length Range Centimeters</u>	<u>Length Mean Centimeters</u>	<u>Frequency*</u>	<u>Percent Comp.</u>
<u>Mainland, Petersburg</u>						
DeBoer**	Rb	3	22.8 - 29.2	26.6	0.08	100%
Goat**	Rb	6	13.9 - 16.5	15.2	0.06	100%
Lower Spurt		No Fish Taken				
<u>Mainland, Skagway</u>						
Lower Dewey**	Rb	20	11.4 - 19.3	14.4	0.55	100%
<u>Woewodski Island</u>						
Harvey	Ct	19	17.7 - 32.7	24.8	0.39	79%
	DV	5	19.0 - 36.5	27.6	0.10	21%

\*Fish catch per hour in 125' vari-mesh gill net.

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\*\*Lake net-sampled for assessment of prior fish stockings.

DV - Dolly Varden	Eb - Eastern Brook
Rb - Rainbow	SS - Silver Salmon
Ct - Cutthroat	RS - Red Salmon
Gr - Grayling	
Kok - Kokanee	

Egg Take Operation:

A weir site for the taking of steelhead eggs was selected on Kah Sheets Creek, Kupreanof Island. The weir was prefabricated in Petersburg and transported to Kah Sheets Bay on the M/V Shearwater.

The weir construction was of 36- x 36-inch square panels, covered with 2-inch hardware cloth. Lateral stringers, supported by poles driven into the stream bed, supported the removable panels. Both an upstream and downstream trap were incorporated in the weir design (Figure 1).

The weir was installed at the mean high tide line at a point where the stream was approximately 130 feet in width and averaged approximately ten inches in depth.

The installation was in operation on April 15 and remained an effective barrier until the termination of the project on May 25, except for a twenty-hour period on May 5 when high water and debris forced removal of the panels.

Steelhead first entered the trap on April 4, and had largely completed their migration by May 25, 1967. A total of 75 steelhead was captured; 47 females and 28 males. Forty-one females were ultimately spawned for 67,235 eggs, an average of 1,639 eggs each.

The fish were spawned in two operations. A total of 23,324 eggs was spawned the first time using the "dry" method, and 43,911 was spawned during the second operation utilizing the "wet" method. Respective initial mortalities were 4,760 and 4,522 eggs. The eggs were transported to the Ketchikan hatchery for rearing.

Average lengths and weights of steelhead held for artificial spawning are presented in Table 5.

TABLE 5 - Average Lengths and Weights of Steelhead, Kah Sheets Creek, 1967.

<u>Sex</u>	<u>Av. Length Centimeters</u>	<u>Lg. Range Centimeters</u>	<u>Av. Weight Pounds</u>	<u>Weight Range Pounds</u>
Male	70.3	57.1 - 86.3	7.6	4.2 - 14.0
Female	70.6	59.6 - 83.8	8.3	4.5 - 13.9

Scale samples were taken from all steelhead trapped and analyzed for age determinations (Table 6).

TABLE 6 - Steelhead Age Classes by Number of Fish Trapped, Kah Sheets Creek, 1967.

Age	1.2	1.3	1.4	2.1	2.2	2.3	3.1
No. of Fish	14	9	4	2	25	4	1

Post Impoundment Study:

Blue Lake, located in Silver Bay five miles east of Sitka, is currently the largest rainbow fishery accessible by automobile in Southeast Alaska.



FIGURE 1. Completed Weir, Kah Sheets Creek, 1967.

In 1959 the lake level was raised approximately 70 feet by the completion of a dam on the outlet. This provides a water and power source for the Alaska Lumber and Pulp Company mill, located approximately one and one-half mile downstream at tidewater.

With the completion of the dam, the surface acreage of the lake was increased from 490 to 1,215 acres, and a significant portion of the tributary spawning area was inundated.

The U.S. Bureau of Commercial Fisheries, River Basins Division, subsequently initiated a long-term sampling program for an evaluation of post-impoundment effects on the spawning rainbow population. An intensive net-sampling program was begun in 1957 and terminated in 1967.

The majority of the fish sampling was conducted by the River Basins Division, as noted in Table 8, although the 1967 data were acquired by the Alaska Department of Fish and Game. Scale samples collected by both agencies were read by Alaska Fish and Game personnel in 1967 for analysis of age-growth characteristics. The data acquired indicate little significant change due to the alteration of the lake level and subsequent tributary inundation.

The population showed a slight increase in condition following the impoundment, followed by a similar decline in approximately 1964. This growth upswing and subsequent fall was expected and appears entirely normal. All age classes are indicated by the scale analysis, and the spawning would appear to be adequate in the existing tributary area.

Population composition by age class is presented in Table 7. It is to be noted that the majority of the population is comprised of two- and three-year-old fish.

TABLE 7 - Age Composition of Blue Lake Rainbow Population, 1957 - 1967.

	No. in Each Age Class					Total Fish
	I	II	III	IV	V	
Ten-Year Sample	-*	253	207	92	5	557

\*Net gear not considered reliable for composition sample on I-year age class.

The age and length data acquired over the ten-year period are depicted in Table 8.

Petersburg Area Creel Census 1967:

The assessment of the sport fish harvest in the Petersburg area, which was initiated during 1966, was again conducted during August and September of 1967. Three major stream systems, Fall's Creek and Blind Slough on Mitkof Island, and Petersburg Creek on Kupreanof Island were censused during 1967.

These three systems support the majority of the sport fishing effort in the Petersburg area for coho, pink salmon, anadromous cutthroat and Dolly Varden. Chum salmon are occasionally taken from Blind Slough and Petersburg Creek. Fall's Creek and Blind Slough are adjacent to the Mitkof Highway and Petersburg Creek is easily accessible by small skiff.

TABLE 8 - Age and Length Characteristics of Blue Lake Rainbow, 1957 - 1967

<u>Year</u>	Length in Centimeters	<u>I*</u>	<u>II</u>	<u>III</u>	<u>IV</u>	<u>V*</u>
1967		-	-	20.1	28.4	34.0
1966	-	-	24.1**	24.1**	-	-
1965	-	-	28.1	30.2**	-	-
1964	-	-	23.4	29.0	43.7**	-
1963	-	-	19.3	35.3	42.2	-
1962	-	-	24.4	31.2	42.2	-
1961	-	-	19.1	27.2	35.6	47.7**
1959	-	-	21.5	27.2	28.7**	-
1958	-	-	18.3	25.4	39.1	-
1957	-	-	20.1	25.7	35.6	40.1

\*Net gear not considered reliable for these size groups.

\*\*Less than five fish sample.

Note: 1967 data collected by ADF&G; prior info. by USFWS.

Fall's Creek crosses the Mitkof Highway at Mile 9. The most popular sport fishing area begins 300 feet below the fish ladder and extends approximately one-half mile out onto the tide flats. As this area is intertidal, fishing success is closely related to tide level with the most productive times being one hour before to one hour after high tide.

Fall's Creek supports the earliest run of coho salmon in the Petersburg area with fish available from mid-July through August. On even years this stream receives good numbers of pink salmon, but has only limited numbers on odd years.

The census was conducted on two randomly selected weekdays and one weekend day throughout the month of August. Census was conducted twice each census day; once in the morning and again in the evening.

Fisherman success was only fair during the first of the month but improved steadily throughout the remainder of the month (Table 9). After the first of September the fish moved on upstream and were no longer easily accessible.

TABLE 9 - Fall's Creek Creel Census Summaries by Weekly Periods, August 1967.

<u>Weekly Period</u>	<u>No. of Fishermen</u>	<u>No. of Hours</u>	<u>Fish Caught</u>			<u>Fish/ Hour</u>	<u>Fish/ Angler</u>
			<u>SS</u>	<u>PS</u>	<u>DV</u>		
Aug. 7-13	11	11	2	1	--	0.27	0.27
Aug. 14-20	11	14	2	--	--	0.14	0.18
Aug. 21-27	30	100	6	3	4	0.13	0.43
Aug. 28-Sept. 3	<u>5</u>	<u>15</u>	<u>2</u>	<u>4</u>	<u>--</u>	<u>0.40</u>	<u>1.20</u>
Totals	57	140	12	8	4	0.17	0.42

Blind Slough is adjacent to the Mitkof Highway from Mile 14 to Mile 22 and can be fished by walking a short distance off the highway.

The most popular fishing area is the "rapids," an intertidal area located approximately one mile above the mouth of the slough. The rapids are reached either by boat (at high tide) or by a foot trail that leaves the Mitkof Highway at Mile 14.

The primary interest of anglers fishing Blind Slough is the coho salmon; however, the slough does contain good numbers of cutthroat and Dolly Varden. The trout are present in the slough throughout the year, but are at their peak of abundance during the salmon runs. Small runs of pink and chum salmon are present in Blind Slough and are occasionally caught while fishing for coho.

Blind Slough was censused from August 1 to September 16, 1967 on two randomly selected week and one weekend day each weekly period. The census was conducted twice each day, once in the morning and again in the evening. Bank fishermen were contacted at the "rapids" and boat fishermen were contacted at the mouth of the slough on each census day.

Fishing success was only fair the first of August but improved steadily and reached a peak about the first of September (Table 10). Numbers of fishermen and fisherman success declined rapidly after the first week in September and resulted in an almost total lack of effort by September 16.

TABLE 10 - Blind Slough Creel Census Summaries by Weekly Periods, August-September 1967.

<u>Weekly Period</u>	<u>No. of Fishermen</u>	<u>No. of Hours</u>	<u>Fish Caught</u>				<u>Fish/ Hour</u>	<u>Fish/ Angler</u>
			<u>SS</u>	<u>CS</u>	<u>DV</u>	<u>CT</u>		
Aug. 1-6	16	32	--	1	12	2	0.46	0.93
Aug. 7-13	2	4	--	4	2	1	1.75	3.50
Aug. 14-20	7	8.5	2	3	1	--	0.70	0.85
Aug. 15-27	24	50	10	--	6	--	0.32	0.66
Aug. 28-Sept. 3	16	54	21	--	--	--	0.38	1.30
Sept. 4-10	9	19	7	--	8	4	1.00	2.10
Sept. 11-17	<u>7</u>	<u>24</u>	<u>7</u>	<u>--</u>	<u>10</u>	<u>--</u>	<u>0.70</u>	<u>2.42</u>
Totals	81	191.5	47	8	39	7	0.52	1.24

Petersburg Creek is located on Kupreanof Island across Wrangell Narrows from the town of Petersburg and is easily reached by small skiff. Petersburg Creek is popular with both residents and nonresidents due to its close proximity to town and to the good runs of salmon and trout that it supports.

The most popular fishing area of Petersburg Creek for coho salmon is the intertidal area which extends nearly two miles upstream from Wrangell Narrows. Here, as at Fall's Creek, the fishing success varies with the tide level. The best success occurs one hour before to two hours after low water.

The creel census was conducted on a less strict schedule than that conducted on Fall's Creek and Blind Slough. Census days were selected at random and the census was taken when the greatest numbers of fishermen were on the stream.

Fisherman success was only fair throughout the entire census period (Table 11). Salmon runs in the Petersburg area were down considerably from those in 1966. Fisherman success on cutthroat and Dolly Varden, however, remained at almost the same level as in 1966.

TABLE 11 - Petersburg Creek Creel Census Summaries by Weekly Periods, 1967.

<u>Weekly Period</u>	<u>No. of Fishermen</u>	<u>No. of Hours</u>	<u>Fish Caught</u>			<u>Fish/ Hour</u>	<u>Fish/ Angler</u>
			<u>SS</u>	<u>DV</u>	<u>CT</u>		
Aug. 1-6	2	3	--	--	1	0.33	0.50
Aug. 7-13	--	--	--	--	--	--	--
Aug. 14-20	13	25	3	7	4	0.54	1.10
Aug. 21-27	6	14	4	1	6	0.78	1.80
Aug. 28-Sept. 3	<u>1</u>	<u>2</u>	<u>2</u>	<u>--</u>	<u>--</u>	<u>1.00</u>	<u>2.00</u>
Totals	22	44	9	8	11	0.63	1.27

The angler catch censused on the sample days was expanded to provide the estimated season catch. Data obtained on census days was applied to total days in the month with an estimated two-thirds of all anglers contacted on any given census day.

Each stream censused was considered separately to avoid bias due to sample size. The total expanded season's catch for Fall's Creek, Blind Slough and Petersburg Creek is presented in Table 12.

TABLE 12 - Estimated Season's Catch Petersburg Area, 1967.

	<u>Total Anglers</u>	<u>Angler Hours</u>	<u>Total</u>					<u>Fish/ Hour</u>	<u>Fish/ Angler</u>
			<u>SS</u>	<u>PS</u>	<u>CS</u>	<u>CT</u>	<u>DV</u>		
Fall's Creek	233	574	49	32	--	--	16	0.17	0.42
Blind Slough	365	862	212	--	36	32	176	0.52	1.20
Petersburg Creek	198	396	81	--	--	99	72	0.63	1.27

Comparative annual Blind Slough and Petersburg Creek sport catches for 1966 and 1967 are presented in Table 13.

TABLE 13 - Estimated All-Season Catches Blind Slough and Petersburg Creek, 1966-67.

	<u>Blind Slough</u>		<u>Petersburg Creek</u>	
	<u>1966</u>	<u>1967</u>	<u>1966</u>	<u>1967</u>
Total Anglers	465	365	369	198
Angler Hours	1,141	862	765	396
Total Coho	349	212	118	81
Total Pink	---	---	224	---
Total Chum	---	---	7	---
Total Ct	76	32	33	99
Total DV	251	176	145	72
Fish/Angler	1.50	1.20	1.42	1.27
Fish/Hour	0.60	0.52	0.68	0.63

Ct - Cutthroat                      DV - Dolly Varden

### Multiple Use Activities:

No specific multiple use activities requiring concentrated study were conducted in the upper Southeast area during 1967.

The anticipated effects of logging, road construction, gravel removal operations, etc., which could influence recreational sport fishing were monitored, and recommendations were made as needed.

Recommendations were made to the various governing agencies, primarily the U.S. Forest Service, regarding the location of trails and possible future campground sites to be considered in conjunction with development of the timber resources.

### Lower Southeast Alaska

The lower Southeast area, or Ketchikan district, encompasses approximately 15,000 square miles with the community of Ketchikan situated near its center.

One aspect of the region, as in the other Southeast Alaska areas, is the meagre road system and the degree of reliance upon boat and airplane for access to the outlying areas. Some logging roads facilitate access to specific waters, but as these are not connected to public roads, initial travel by boat and plane is still a necessity.

The lower Southeast area is characterized by steep, mountainous terrain with many lakes. The streams are of steep gradient and fed by the 160-inch average annual rainfall.

Lakes at elevation 3,500 feet or greater may not lose their winter ice cover, and in some areas glaciers may exist as low as 1,000 feet elevation.

The primary area of investigational work was on waters in closest proximity to population centers, and on those with suitable access to the sport angler. A more cursory survey was conducted on those more remote waters which appeared to have the greatest future potential.

Biological, physical, ecological and chemical properties of the lakes surveyed were noted as needed. Many of the lakes previously surveyed have common characteristics and there was little need to duplicate these tests. Those waters that produce no fish in standard testing procedures are closely checked for spawning and rearing areas as a necessity in evaluation for subsequent introduction of fish. Also, carefully noted were all factors that could influence fish environments. Streams accessible to fish from salt water or streams tributary to lakes having fish are used for spawning. Rearing areas are limited in many lakes. Normally, most of the fish leave the streams during the low winter cold flows which severely restrict the production of food and the fish environment.

Productivity standards for the waters of the Ketchikan Area are very low by comparison with areas of considerably less rainfall and richer soils. Water checks of past work have shown that hydrogen ion readings are from 7.0 to 5.6, calcium hardness is up to 15 ppm, and that waters are cool (39.5° F. below the thermocline and seldom above 63° F. on the surface) and of high exchange rate with the normal 160-inch rainfall. None of this has changed noticeably and no additional work was done on water chemistry. Relative fertility was judged by visual evidences upon inspecting waters under survey.

Lake Investigations, Lower Southeast Alaska:

Twenty-two lakes were investigated in the lower Southeast area during the 1967 field season. Fourteen were surveyed for the first time for an assessment of existing fish populations and determination of future management potential, and eight lakes were re-checked to determine prior stocking success and condition of fish in general.

The lakes depicted in Table 14 are those that received initial investigational surveys during the summer of 1967.

TABLE 14 - Initial Lake Surveys, Lower Southeast Alaska, 1967.

<u>Lake</u>	<u>Location</u>	<u>N. Latitude</u>	<u>W. Longitude</u>	<u>Quadrangle</u>
Backbone Mtn.	Mainland	50° 10' 55"	130° 59' 10"	Ketchikan A-3
Upper Niblack (2)	Pr. Wales Is.	55° 5' 00"	132° 8' 00"	Craig A-1
Kendrick (2)	Pr. Wales Is.	54° 52' 00"	132° 7' 00"	Dixon Ent. D-4
Johnson Cove	Pr. Wales Is.	55° 58' 00"	132° 6' 00"	Dixon Ent. D-1
Scout	Mainland	55° 42' 00"	132° 2' 00"	Craig C-1
Crater	Mainland	55° 20' 00"	131° 45' 00"	Ketchikan D-6
Niblack Point	Mainland	55° 34' 00"	132° 7' 00"	Craig C-1
Rainbow	Mainland	55° 38' 00"	132° 7' 00"	Craig C-1
Thorne	Pr. Wales Is.	55° 46' 00"	132° 46' 00"	Craig D-3
Bower	Mainland	55° 2' 00"	135° 36' 00"	Ketchikan A-2
Cobb	Mainland	55° 3' 00"	130° 39' 00"	Ketchikan A-2
Sykes	Mainland	55° 9' 00"	131° 0' 00"	Ketchikan A-3
Miller	Pr. Wales Is.	55° 8' 00"	132° 15' 00"	Craig A-1
Sweetwater	Pr. Wales Is.	55° 58' 00"	132° 57' 00"	Craig D-3,4

A brief resume of each of the new lakes surveyed during the 1967 field season follows, and includes locations, biological characteristics, means of access, and management recommendations.

Backbone Mountain Lakes (2) - unofficial name These two lakes lie on the west side of Backbone Mountain at an elevation of 1,190 feet and 1,225 feet respectively. The lower lake is 65 acres and the upper 89 acres. They are 27 airline miles southeast of Ketchikan. The lakes are in alpine area and the watershed measures 1,054 acres. There are many impassable falls in the outlet and the lakes are devoid of fish. The water is noticeably stained with muskeg and there are areas of nuphar. The outlet appeared to be approximately 3 cfs, which is normal summer flow. Spawning gravels appear to be adequate for a fish population. Access is possible, weather permitting, by small plane or by hike through the woods from the beach three miles away. Management of this lake is not high priority.

Upper Niblack Lakes (2) - unofficial name These two lakes are the highest (630 feet and 1,350 feet) in the drainage of Niblack anchorage on Prince of Wales Island. The lower is approximately 90 acres and the upper 70 acres. The upper lake appears to be devoid of fish but the lower may contain Dolly Varden. These lakes are not of high management priority at the present time. They are 28 miles southwest of Ketchikan across Clarence Strait. Access is by plane to the largest Niblack Lake and a 1 1/2-mile hike through the brush. Both lakes are marginal in size for small aircraft.

Kendrick Lakes (2) - unofficial name These lakes of 124 acres (upper) and 310 acres lie at the head of the Hunter Bay Drainage on Prince of Wales Island. The upper is at 536 feet elevation and the lower at approximately 525 feet. They are located between the heads of South Arm and West Arm of Kendrick Bay. A visit was made to the lower lake on August 14 and an attempt was made to take fish with sport tackle. None were captured but those observed were thought to be Dolly Varden. Several falls exist at the outlet which would block fish migration. The normal summer outlet flow was 5 cfs. The lake appears deep and should support a game fish population. It is 32 air miles southwest of Ketchikan and 1 1/2 miles from the head of Short Arm of Kendrick Bay.

Johnson Cove Lake - unofficial name This 186-acre lake lies 1/2 mile south of the head of Johnson Cove, off Moira Sound on Prince of Wales Island. The elevation is estimated at 110 feet and the outlet is passable for migrating fish. The lake is known to harbor a sockeye and silver salmon run. An attempt to take fish was made with sport gear, and although cutthroat were seen, none was taken. It is expected that Dolly Varden, steelhead and rainbow also use the lake. Angler use to date is nil and no immediate management measures are necessary.

Scout Lake - unofficial name This is a small (62-acre) lake north of the flats in the head of Helm Bay on Cleveland Peninsula. It lies at an estimated 450-foot elevation and is 9/10-mile long. A check was made on the population of fish over July 20-22. Cutthroat and Dolly Varden were taken in the nets and all were between 6 and 7 1/2 inches long. The outlet drains into Hofstad Lake and then into Vixen Inlet. Normal summer flow of the lake outlet is 1/2 cfs. The watershed is 744 acres and mostly timbered. Angling pressure is nil and no new management measures are necessary at present. Access is by plane or by hiking 1 2/10 mile from the Helm Bay tide flats.

Crater Lake - unofficial name This is an alpine lake lying at an elevation of 1,305 feet. It is 62 surface acres in size, located on Cleveland Peninsula. It lies in an open cirque and is 1 1/2 mile up the hill west of the head of the tideflats of Helm Bay. The water is clear and the outlet has many barrier falls. Normal summer flow is 2 cfs. The lake is judged barren of fish as none were taken in eight net days. The watershed is small (372 acres) and the lake bottom is glacial gravel and organic muck. It is marginal for access by airplane. A plant of rainbow trout is recommended.

Niblack Point Lake - unofficial name A small lake of sixty-two surface acres located on the Cleveland Peninsula 1 1/2 mile north of the Niblack Point Light at an elevation of about 475 feet. The outlet has many high falls that are barriers to ascending fish, and the normal summer flow is 5 cfs. There are two inlets at the head of the lake which have good spawning gravels. The watershed is 3,596 acres of spruce-hemlock-cedar forest. The lake depth is estimated to be 100 feet with an average depth of 50 feet. A check with experimental gill nets disclosed no fish in six net days. Access is by plane or by a hike through the woods from Clarence Strait 1 1/2 mile away. As this lake is only 25 miles from Ketchikan, it may be desirable to initiate management measures on it.

Rainbow Lake - unofficial name This lake lies in a glacial basin 3 1/4 miles northeast of Ship Island in Clarence Strait, on the Cleveland Peninsula. Surface acreage is 155 at an elevation of 690 feet. The lake has a gravel and boulder bottom with some bedrock outcrops. There are extensive areas of nuphar and potamogeton and the water carries muskeg stain. The watershed is 2,294 acres of mixed muskeg and timber. The lake has two inlets with a normal flow of 1/2 cfs in the summer. Spawning grounds are quite adequate. Depths appear to run over 100 feet with an average of 40 to 50 feet. This

lake was test netted July 20-22 and only rainbow trout were taken. No new management measures are recommended for this lake. It is 29 miles by air from Ketchikan.

Thorne Lake - The Thorne River drainage at Prince of Wales Island has many lakes tributary to the main river. Thorne Lake is a 279-acre body of water that appears to be not over 20 feet deep and to average approximately ten feet. Beds of nuphar and potamogeton are very extensive and the water is dark with muskeg stain. The lake was checked in August. Sport gear catches confirmed that the lake was populated with cutthroat and that it is accessible to migratory fish. Sportsmen use the lake occasionally for deer or waterfowl hunting, access is by plane, and hiking in is not practicable. No new management measures are necessary for this lake at the present time. It is 57 air miles northwest of Ketchikan.

Bower Lake - A 155-acre lake at elevation 550 feet, tributary to Humpback Lake and Mink Arm of Boca de Quadra, it is 48 air miles southeast of Ketchikan. The lake is quite deep and measures over 100 feet in the deepest area. There is some sandy beach area on the south end. Several small drainages are tributary to the lake. The outlet has a normal summer flow of 4 cfs. The lake was checked on August 15-16 with six experimental gill nets and no fish were taken. The water has some muskeg stain. The watershed measures 1,612 acres of heavily forested slopes with alpine areas above 1800 feet. It may be desirable to plant the lake with grayling at the earliest opportunity. Access is by plane or a rough 1/3-mile hike up the outlet from Humpback Lake.

Cobb Lake - unofficial name - This lake of 64 surface acres lies in the upper reaches of Cobb Creek which is tributary to Hugh Smith Lake on Boca de Quadra. There are two smaller lakes also in the system, one of which is tributary to Cobb Lake. The water carries some muskeg stain and the surface elevation is 539 feet. The lake appears to be over 50 feet deep with much bedrock bottom. The outlet flow is normally 4 to 6 cfs in the summer, and there are many impassable falls between Cobb Lake and Hugh Smith Lake below. Spawning areas are adequate. The lake was checked on August 15 and found to hold a climax population of cutthroat trout. No new management measures are needed for this lake. Access is by plane or an 8/10-mile hike from the west extremity of Humpback Lake. The lake lies 46 miles southeast of Ketchikan.

Sykes Lake - unofficial name - A 155-acre lake lying beneath Backbone Mountain south and northeasterly of Slate Islands on the mainland between Boca de Quadra and the entrance of South Behm Canal. Its surface elevation is 285 feet and the outlet which normally flows 5 to 8 cfs in the summer crosses the beach near Black Island. The distance from the lake outlet to the beach is 2 6/10 airline miles. The lake is well over 100 feet deep and has two tributary streams that satisfy the spawning needs of the cutthroat population. There is considerable growth of nuphar and potamogeton in the shallow areas. A check was made on this lake on August 15 and sport fishing gear confirmed the fish population. No new management measures are necessary on this lake which is accessible by aircraft. It lies 30 miles southeast of Ketchikan.

Miller Lake - A good sized lake (341 surface acres) on Prince of Wales Island north of, and tributary to, Clarno Cove off the North Arm of Moira Sound. Its elevation is listed as ten feet and some high tides almost back into it. The lake appears to be over 90 feet in depth with a bottom composition of gravel and rock in the shoals, and sand and muck in the depths. Two streams are tributary to the lake and have excellent spawning gravels. Inlet flows of 25 to 10 cfs respectively are normal for summer. The outlet summer flow is approximately 40 cfs. This lake has a history of sockeye production which supported a cannery at one time. These runs are much reduced and trout fishing is also poor. The watershed is 5,952 acres and is mostly forested.

The lake lies 27 miles southwest of Ketchikan. A check was made on the lake August 14 and a few sockeye salmon were schooled at the tributary mouths. No fish were taken.

Sweetwater Lake - This lake of 1,800 surface acres (estimated) on the north end of Prince of Wales Island lies about two feet above mean high tide. It discharges through Gold and Galligan Lagoon and enters upper Clarence Strait at the south end of Kashevarof Pass. The lake is estimated to be over 100 feet deep, but has a number of shoals and reef areas. The higher tides create a swift reverse flow and raise the lake as much as four feet. All species of salmon except kings use the system as well as the indigenous other salmonoids, cottoids, Cottus Sp., and sticklebacks, Gasterosteus Sp. There are six tributary streams ranging in flow from 1 to 35 cfs normal summer flow. The watershed is about 130,000 acres, mostly forested. Good spawning gravels bottom these streams. Sport angling is usually done at the outlet in the tide-zone rapids for searun cutthroat. There is a new recreation cabin on the lake which lies 67 airline miles northwest of Ketchikan.

In addition to the 14 initial lake surveys, the 8 lakes in the following table were re-investigated and sampled by "hook and line" to determine if previous stockings were successful and if a self-maintaining population was established.

The date of the original stocking, species introduced, and age-growth data from scale analysis are presented in Table 15.

TABLE 15 - Stocking Evaluations, Lower Southeast Alaska, 1967.

<u>Lake</u>	<u>Species</u>		<u>Ave. Length in Centimeters</u>				
	<u>Introduced</u>	<u>Date</u>	<u>Age 1</u>	<u>Age 2</u>	<u>Age 3</u>	<u>Age 4</u>	<u>Age 5</u>
Upper Silvis	Rb	1954			27.9	35.5	
Loon	Rb	1963				40.6	
Hooter	Rb	1963				30.4	
Grouse	Rb	1963		16.5			
Ouzel	Rb	1963				33.0	
Sliver	Rb	1963	No	Fish	Taken		
Steep	Rb	1964	Rainbow	Recovered	-	No	Data
Goose	Rb	1954			22.8	24.1	27.9

\*Gill Net Sample

Rb-Rainbow

Recommendations for future fish stockings in the Ketchikan area are based largely on the findings of surveys conducted during the 1967 season. All the lakes depicted are currently devoid of fish. The lakes, their location, and recommended species for introduction are depicted in Table 16.

TABLE 16 - Fish Stocking Recommendations, Lower Southeast Alaska, 1967.

<u>Lake</u>	<u>Locations</u>	<u>Recommended Species</u>
Blue	Revillagigedo Isl.	Grayling
Marge	Pr. of Wales Isl.	Grayling
Crater	Helm Bay, Mainland	Rainbow
Bower	Quadra, Mainland	Grayling
Kendrick (2)	Pr. of Wales Isl.	Rainbow

### Population Analysis

A resume of the lakes test-netted with vari-mesh gill nets for population analysis in lower Southeast Alaska is presented in Table 17.

Duration of sampling varied depending on the purpose of the investigation. Generally, the lakes under initial assessment were sampled for a longer period (up to six net days) for positive determination of existing fish species, if any.

The lakes test-netted only for indications of previous stocking success were subjected to a briefer period of gill net effort.

TABLE 17 - Test Netting Summaries, Lower Southeast Alaska, 1967.

<u>Lake</u>	<u>Species</u>	<u>No. of Fish</u>	<u>Length Range Centimeters</u>	<u>Length Mean Centimeters</u>	<u>Percent Comp.</u>
Scout	Ct	42	15.0 - 19.0	17.0	74%
	Dv	15	15.2 - 19.0	17.0	26%
Rainbow	Rb	29	13.0 - 35.0	23.0	100%
Goose	Rb	9	20.8 - 31.2	24.6	100%
Crater	None				
Niblack Pt.	None				
Bower	None				

Ct - Cutthroat                      Dv - Dolly Varden                      Rb - Rainbow

### Fish Stockings

Nine lakes were stocked with either rainbow trout or Arctic grayling in the lower southeast area during 1967. Six barren lakes were stocked for the first time, while Harriet Hunt, Summit, and Halfmoon Lakes were stocked as a continuation of a current stocking program.

Names and locations of these lakes, and numbers of fish stocked by species are presented in Table 18.

TABLE 18 - Lake Stockings, Lower Southeast Alaska, 1967.

<u>Lake</u>	<u>Location</u>	<u>Species</u>	<u>Number</u>
Lower Lunch Cr.	Revillagigedo Is.	Grayling	10,000
Halfmoon	Yes Bay, Mainland	Grayling	30,000
Summit	Copper Hbr. Pr. of W.	Grayling	10,000
Upper 2nd Waterfall Creek	Revillagigedo Is.	Rainbow	1,000
Upper Lunch Creek	Revillagigedo Is.	Rainbow	1,000
Harriet Hunt	Revillagigedo Is.	Rainbow	20,000
Dickman Bay	Pr. of Wales Is.	Rainbow	15,000
Kegan	Pr. of Wales Is.	Rainbow	10,000
Upper Kegan	Pr. of Wales Is.	Rainbow	15,000

### Creel Census

A creel census of freshwater anglers was conducted largely on an opportunity basis. No formal census design was employed, nor was the selection of the check sites or streams particularly indicative of the angler pressure pattern. The data shown in Table 19, however, indicate relative angler abundance and catch for the streams noted.

The rather high comparative catch of cutthroat is considered normal because of their common occurrence and popularity. Some are taken incidental to steelhead fishing, as are the rainbow and Dolly Varden. Both pink and silver salmon were in short supply in the Ketchikan area during 1967 and therefore did not enter the creel in the usual numbers.

TABLE 19 - Freshwater Creel Census, Ketchikan Area, 1967.

<u>Date</u>	<u>Location</u>	<u>Anglers</u>	<u>Ct</u>	<u>St</u>	<u>Rb</u>	<u>DV</u>	<u>SS</u>
1/1 s*	Naha River	7		12			
1/2	" "	2		1			
1/3	" "	1		2			
2/8 s	" "	3		3			
2/18	" "	3		0			
2/19	" "	3		0			
4/8 s	Karta River	3		6			
4/9 s	" "	3		4			
4/10	" "	3		2			
4/20	" "	3		9**			
4/27	" "	3		4		6	
4/29 s	Helm Lake Outlet	2	19			1	
4/30 s	" " "	2	15			1	
5/6 s	Wolverine Creek	2	2	4	3	2	
5/7 s	" "	2	4	2	1	3	
5/12	" "	3	1	3	1	2	
5/30 h*	Port Stewart	2		1**			
6/17 s	Winstanley Lake	2	30				
6/18 s	S. Behm Canal	2					
7/1 s	S. Arm Rudyerd Bay	2				3	
7/2 s	Nooya Creek	2			7		
7/3	Winstanley Lake	2	30				
7/15 s	Port Stewart	2	12			8	
7/16 s	" "	2	10				
8/5 s	LeDuc Lake	3			10		
8/6 s	Old Frank's Lake	3	12				
10/5	Sweetwater Lake	2					3
10/12	Naha River	2		3			
10/13	" "	2		6	2	3	
10/14 s	" "	2		1	1	6	
11/8 s	" "	4	1	12			
11/9 s	" "	2		6			
11/24	" "	15		2			
11/25 s	" "	17		2			
12/31 s	Karta River	3		4		4	
Totals		116	136	89	25	39	3

\*Sundays or Holidays

\*\*Released 6 more

#### Egg Take Operation

Assistance was given in the construction and operation of the Kah Sheets Bay weir, discussed earlier in the report. Steelhead eggs taken at Kah Sheets Bay were ultimately transported to the Deer Mountain Hatchery at Ketchikan where they were hatched and reared to stocking size.

The search for an egg source for trout, char, and salmon continues. This has been largely accomplished in conjunction with other field activities. Several sites were, however, inspected as potential egg take sources for steelhead.

Kegan Creek appears to be of a size suitable for the establishment of a weir, but the stream is supporting an increasing sport fishery on its limited run. For this reason, some reluctance to establish a weir exists. Miller Lake outlet is also of a size that could be handled but the size of the run is uncertain. Dolomi Creek has a small run but is currently being logged, and the future effects of these ecological changes is unknown.

#### Multiple Use Activities

The effect of watershed use activities has been reviewed with respect to effect on sport fisheries. Monitoring road construction, stream bed alteration, gravel removal and physical effects on the water and flow rates continues.

Close attention is being given those waters accessible from the Tongass Highway System. Most of these are under intensive management at the present time. However, several lakes are still excluded by reason of domestic water use, late ice covers or access difficulties.

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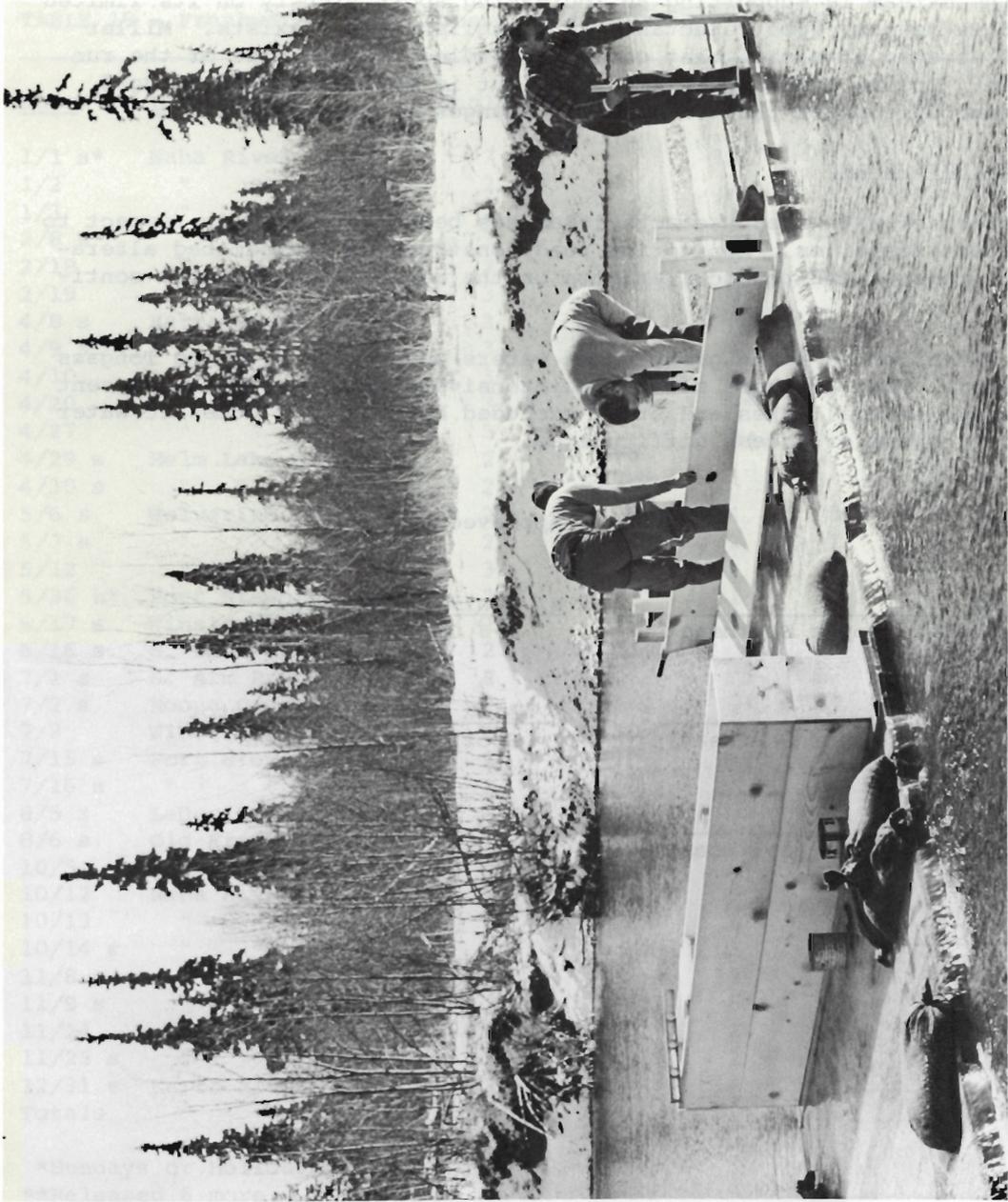
s/ Louis S. Bandirola  
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Fishery Biologist, Upper Southeast

s/ Alex H. McRea, Director  
Sport Fish Division

Robert Baade  
Fishery Biologist, Lower Southeast

Date: June 30, 1968



Carpentry is one of the many Non-Scientific Requirements that a Biologist soon Becomes Familiar with. This Field Crew is Constructing a Weir to Sample Fish Populations and Movements.